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(19) (CA) **CANADIAN PATENT** (12)

(54) Shuttering Elements

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**Canada**

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ABSTRACT OF THE DISCLOSURE

This invention relates to shuttering or sheathing elements of hard expanded plastics material for construction of buildings by the concrete casing method, of the kind comprising two mutually parallel panels or slabs having a tongued and grooved form at their edges and webs interconnecting the panels. According to the invention the panel forming the outer casing is considerably thicker than the panel of the element forming the inner casing.

The present invention relates to a shuttering or sheathing element of hard expanded plastics material for use in the concrete casing method of construction, comprising two panels arranged parallel to each other and having a tongue and groove structure at their edges and webs inter-connecting the panels.

A shuttering element corresponding to the type referred to above is disclosed in the German Patent Specification No. 1,784,573. The two panels forming the corresponding subsequent insulating jackets are identical in thickness in this element. This has the disadvantage that, since the thickness of the panels is relatively large to ensure a very satisfactory heat barrier, the period of vapour travel through the cavity-side panel forming the inner jacket is of considerable length. The humidity exchange between the wall of the structure and the internal space is thereby completed in comparatively sluggish manner, which has an unfavourable effect on the interior environment. It has been observed moreover that the possibility of anchoring fastening means, e.g. dowels, needs improving so that even heavy objects may be fastened to the walls by means of simple dowels.

The present invention provides an improved shuttering element of the type referred to above, so that, whilst ensuring an excellent heat barrier, a comparatively rapid vapour permeability at the interior side, a more satisfactory exploitation of the poured concrete as a heat store, as well as secure anchoring of fastening means, are accomplished.

5       The present invention thus provides a shuttering or sheathing element of hard expanded plastics material for use in the concrete casing method of construction, comprising two mutually parallel panels with a tongued and grooved structure at their edges and webs connecting the panels, wherein the panel forming the outer casing is thicker than the panel forming the inner casing.

10       Under retention of very satisfactory heat barrier action, the thinner panel subsequently situated at the inner side simultaneously improves vapour permeability from the inner side, so that humidity may penetrate comparatively rapidly from the interior volume into the concrete core present in the shuttering elements assembled and filled with  
15       concrete, so that the feature of the interior environment depending on humidity is rapidly controlled. On the other hand, the concrete core may also be exploited more satisfactorily as a heat store, since it is reached more rapidly by the heat of the room, and conversely can return  
20       comparatively more stored heat into the room. Because of the comparatively thin panel forming the inner jacket or the inner side of the room, longer fastening means being dowels in particular, penetrate to an adequate depth into the concrete and provide a better hold thereby, so that  
25       even heavy objects may be fastened to a wall of this nature.

30       The element includes Z-shaped webs, the portions of the thicker panels at least which lie opposite to the central part of the webs being recessed.

- 1 Also, the connecting elements of the webs terminate  
flush with the panel edge and the extremity of the  
central web sections, and the inner horizontal portion  
of the connecting elements have a curved outline  
5 shape.

A structural shuttering or sheathing element of  
this kind has an increased breaking strain, that is, where  
rammed concrete or plastic concrete is used. In the  
first case, shrinkage points or cavities are no longer  
10 produced during ramming directly below the downwardly  
directed horizontal surfaces of the connecting elements  
of the webs, since the ramming tool may conveniently  
reach these points or reliably carry concrete in the  
direction towards these points. A separation can no  
15 longer occur at these points even upon pouring  
plastic concrete, since proportions of coarser grit or  
gravel of the concrete can also reach these points.  
Furthermore, an increase in strength is also obtained  
by the fact that more concrete may be introduced into  
20 at least some of the gaps between the panel and web,  
so that a thicker concrete web is formed.

In order that the invention may be more clearly  
understood, reference will now be made to the accompanying  
drawings which show one embodiment thereof by way of  
25 example and in which:-

Figure 1 shows an end view of the element,

Figure 2 shows a plan view corresponding to the  
arrow A of Figure 1, and

Figure 3 shows a partial cross-sectional illustration  
30 along the line III-III of Figure 2.

1 Referring to Figures  
1 and 2, the shuttering or sheathing element 1 which  
is for use in the construction of buildings by the  
concrete casing construction method, comprises two  
5 mutually parallel plastics material panels or slabs  
2 and 3 of hard expanded plastics material, e.g.  
styrofoam. At their edges or narrow sides, the panels  
are provided with a configuration consisting of a  
groove 4 and tongue 5, in conventional manner. The  
10 panel forming the outer casing is of thicker construction  
than the other and is utilised to form an external jacket  
having a powerful heat barrier action, for the outer walls  
of the building. In the example, the panel 2 is  
considerably thicker than the other panel 3, e.g. three  
15 times as thick. As a rule, the thickness of the outer  
panel 2 will be of the order of magnitude of 4 cms to  
20 cms and will preferably amount to say 12 cms; the  
thickness of the inner panel or slab 3 will be of the  
order of magnitude of 2 cms to 8 cms and will preferably  
20 amount to say 5 cms.

Furthermore, the tongued and grooved configuration  
4, 5 of the thicker panel 2 is also made wider as  
compared to that of the thinner panel 3. This greater  
size of the one tongued and grooved structure contrib-  
25 utes to firmer cohesion between the assembled shuttering  
elements under appropriately close tolerances, and is  
moreover less liable to incur breakage during trans-  
portation and handling of the elements.

The panels 2, 3 are preferably interconnected by  
30 Z-shaped webs 6 and 7. The central part 6a, 7a of the

1 webs extends at both extremities up to the edges or  
narrow sides of the panels 2, 3 and may be provided at  
one end of the element with a stud 8 and at the other  
end with a corresponding recess 9. Moreover, the  
5 areas 6b and 7b of the webs directly opposed to the  
panels are preferably made in rounded or polygonal  
form or are formed in curved manner in another way  
(Figure 2). The connecting elements 6c and 7c, res-  
pectively of the webs 6 and 7 extend over say half the  
10 height of the panels 2, 3 and at their one end  
terminate in flush and equiplanar manner with the panel  
edge and the end of the central part 6a, 7a of the  
webs. On the other hand, their inner horizontal  
section 6d and 7d, respectively, is rounded in outline  
15 or made curved in another manner, as clearly apparent  
from Figure 3.

At least the thicker panel 2 of the element 1 has  
recesses 10 placed opposite to the sections 6b and 7b  
of the webs 6 and 7 and allow of thicker concrete  
20 coupling webs being formed subsequently in the gaps  
delimited thereby.

The webs 6, 7 may comprise means for fixing  
conventional reinforcing fittings. As apparent from  
Figure 2, sections 11 which receive or fix reinforcing  
25 fittings 12 may be integrated in the areas of  
transition from the connecting elements 6c, 7c to the  
thinner panel 3.

As apparent from Figures 1 and 2 and especially  
from Figure 2, the Z-shaped webs 6, 7 of the element 1  
30 are turned with respect to each other to establish mirror

- 1 symmetry. The subsequent result is a meandering path of the concrete poured in, which in particular signifies an increase of the morphological strength of the cured concrete.
  - 5 In an advantageous development, one feature consists in that preferably the thicker panel 2 forming the outer casing is provided with vertical grooves 13. These grooves assure improved adhesion of a plaster facing (not shown) on the external surface of the panel 2.
  - 10 Alternately, or complementarily, horizontal grooves 14 may also be incorporated. The grooves have a width of, say, 2 -3 mms. and a depth of 2 mms.
- The shuttering or sheathing element described is advantageously made in modular sizes in length, e.g.
- 15 in the sizes 12.5 cms, 25 cms, 50 cms and 100 cms. The height may for example amount to 33.3 cms and the width to 36 cms, for example.



THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A shuttering or sheathing building construction element of rigid expanded plastics material for the concrete casing method of construction, comprising two mutually parallel panels having a tongue and groove structure at their edges, Z-shaped webs connecting the panels, the central section of the Z-webs extending up to the height of the panel edges and having curved marginal areas which areas lie parallel to and face toward the opposite panel, the panel forming the outer casing being thicker than the panel forming the inner casing, the thinner panel thus affords greater permeability to humidity and improved heat exchange compared to the outer panel, the areas of at least the panel forming the outer casing which lie opposite to said curved marginal areas of the Z-webs being recessed, connecting elements of the Z-webs terminating flush with the panel edge and the extremity of the central web sections and the inner horizontal portion of the connecting elements being of curved outline shape and, as seen in plan view, two adjacent Z-webs being turned through 180 degrees with respect to each other in each element.

2. An element according to claim 1, wherein the thickness of the panel forming the outer casing is 4 to 20 cms and the panel forming the inner casing is 2 to 8 cms.

3. An element according to claim 1 or 2, wherein the outer casing panel is approximately 12 cms thick and the inner casing panel is approximately 5 cms thick.

FIG. 1

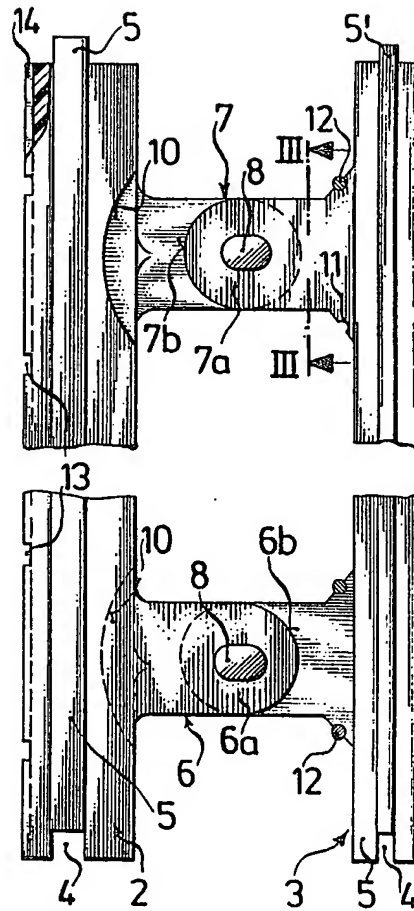
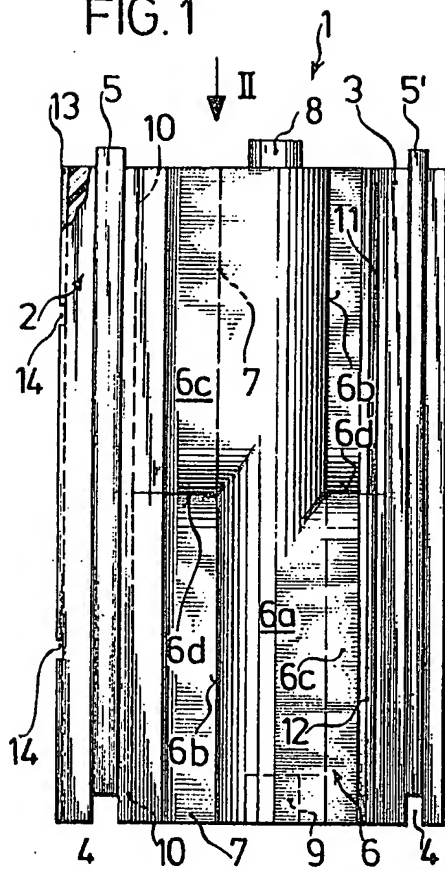


FIG. 2

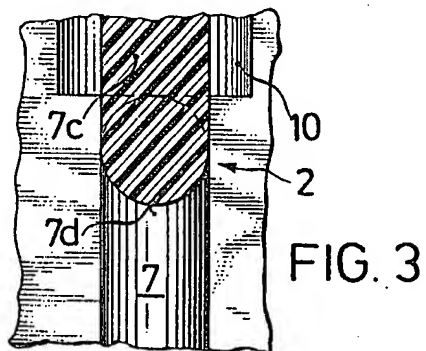


FIG. 3

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